Mechanistic Model for Atomization of Superheated Liquid Jet Fuel, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

As air-breathing combustion applications advance, increased use of fuel for cooling, combined with cycle advancements, leads to a situation where the fuel can become superheated. While this can lead to potential benefit in terms of the eventual fuel injection process, with enhanced atomization and evaporation, it creates a significant challenge relative to any computational design tools that might be used in these systems. Dealing with the superheat behavior in the injection of a liquid fuel requires substantially more physical phenomena to be accounted for compared to a subcooled system. As a result, detailed data and models for this behavior as encountered in practical fuels are needed in order to validate and evolve the models needed. In the work proposed, emphasis will be given to the injection of a plain liquid jet under superheated conditions. In Phase I the behavior of the liquid internal to the injector will be addressed, with both models and experiments carried out. The models evolved will be incorporated into an existing simulation environment developed by ERC for atomization of liquid jets. In addition, data will be available for CFD validation.

Primary U.S. Work Locations and Key Partners

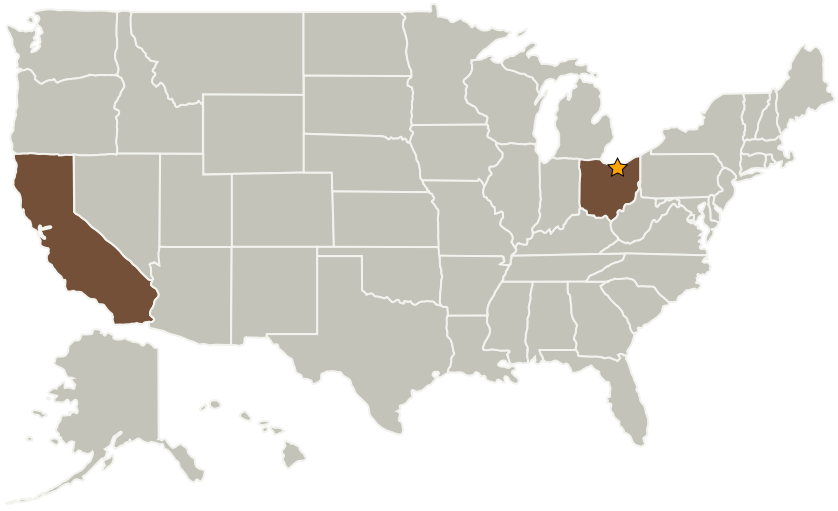

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Energy Plus Ltd.	Supporting Organization	Industry	Laguna Hills, California

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Vincent Mcdonell

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.5 Hybrids